GS CAPSULE - II

Some Important examples of physics:

Some examples of Inertia or Newton's first law

- When a car or train starts suddenly, the passengers bends backward.
- When a running horse stops suddenly, the rider bends forward.
- When a coat/blanket is beaten by a stick, the dust particles are removed.

Newton's second law examples

- It is easier for a strong adult to push a full shopping cart than it is for a baby to push the same cart. Also, it is easier for a person to push an empty shopping cart than a full one.
- Train wreck. If a train hits another train of equal force and speed, they will both go the same distance and feel the same force. But if the first train is hooked to a second, the single train will go twice the distance of the double train and will feel twice the force.
- A bowling ball and a marble dropping at the same time.

Newton's third law examples

- When a bullet is fired from a gun with a certain force (action), there is an equal and opposite force exerted on the gun in the backward direction (reaction).
- When a man jumps from a boat to the shore, the boat moves away from him. The force he exerts on the boat (action) is responsible for its motion and his motion to the shore is due to the force of reaction exerted by the boat on him.
- The swimmer pushes the water in the backward direction with a certain force (action) and the water pushes the swimmer in the forward direction with an equal and opposite force (reaction).
- The value of G is 6.67 x 10-11 Nm^2/kg^2.
- The acceleration produced in a body due to force of gravity is called acceleration due to gravity (denoted as g) and its value is 9.8 m/ s^2

Variation in *g*

- value of *g* decreases with height or depth from earth's surface.
- *g* is maximum at poles.
- *g* is minimum at equator.
- *g* decreases due to rotation of earth.
- *g* decreases if angular speed of earth increases and increases if angular speed of earth decreases.

Weight of a body in a lift

- If lift is stationary or moving with uniform speed (either upward or clown ward), the apparent weight of a body is equal to its true weight.
- If lift is going up with acceleration, the apparent weight of a body is more than the true weight.
- If lift is going down with acceleration, the apparent weight of a body is less than the true weight.
- If the cord of the lift is broken, it falls freely. In this situation the weight of a

body in the lift becomes zero. This is the situation of weightlessness.
- While going down, if the acceleration of lift is more than acceleration due to gravity, a body in the lift goes in contact of the ceiling of lift.

Kepler's laws of planetary motion:
- All planets move around the sun in elliptical orbits, with the sun being at rest at one focus of the orbit
- The position vector of the planet with sun at the origin sweeps out equal area in equal time i.e. The areal velocity of planet around the sun always remains constant.

- Speed of a planet is maximum when it is at perigee and minimum when it is at apogee.
- The orbital speed of a satellite revolving near the surface of earth is 7.9 km / sec.
- For earth, escape velocity = 11.2 km/s.
- For moon, escape velocity = 2.4 km/s.

Atmospheric pressure decreases with altitude.
- It is difficult to cook on the mountain
- The fountain pen of a passenger leaks in aeroplane at height

- Atmospheric pressure is measured by **barometer.**
- **Sudden fall** in barometric reading is the **indication of storm**.
- **Slow fall** in barometric reading is the **indication of rain**.
- **Slow rise** in the barometric reading is the **indication of clear weather**.

Uses of Concave mirror :
- Shaving glass.
- Reflector for the head lights of a vehicle, search light.
- In ophthalmoscope to examine eye, ear, nose by doctors.
- In solar cookers.

Uses of Convex mirror :
- Rear view mirror in vehicle because it provides the maximum rear field of view and image formed is always erect.
- In sodium reflector lamp.

Refraction of light: When a ray of light propagating in amedium enters the other medium, it deviates from its path. This phenomenon of change in the direction of propagation of light at the boundary when it passes from one medium to other medium is called refraction of light.

Some illustrations of Refraction
- Bending of a linear object when it is partially dipped in a liquid inclined to the surface of the liquid.
- Twinkling of stars.
- Oval shape of sun in the morning and evening.
- An object in a denser medium when seen from a rarer medium appears to be at a smaller distance.
- A fish in a pond when viewed from air appears to be at a smaller depth them actual depth. A coin at the base of a vessel filled with water appears raised.

Total Internal Reflection : If light is propagating from denser medium towards the rarer medium and angle of incidence is more than critical angle, then the light incident on the boundary is reflected back in the denser medium, obeying the laws of reflection. This phenomenon is called total internal reflection as total light energy is reflected, no part is absorbed or transmitted.

For total internal reflection:
- Light must be propagating from denser to rarer medium.
- Angle of incidence must exceeds the critical angle.

examples of total internal reflection
- Sparkling of diamond .
- Mirage and looming.
- Shining of air bubble in water.
- Increase in duration of sun's visibility-The sun becomes visible even before sun rise and remains visible even after sunset due to total internal reflection of light.
- Shining of a smoked ball or a metal ball on which lamp soot is deposited when dipped in water.
- opticalfibre.

Differnce between concave and convex lens

When a lens is thicker at the middle than at the edges, it is called a convex lens or a converging lens.

When the lens is thicker at the edges than in the middle, it is called as concave lens or diverging lens.

Power of a convex lens is positive and that of a concave lens is negative.

Scattering of light : When light waves fall on small bodies such as dust particles, water particles in suspension, suspended particles in colloidal solution, they are thrown out in all directions.
Scattering of light is maximum in case of violet colour and minimum in case of red colour of light.
Blue colour of sky is due to scattering of light.
The brilliant red colour of rising and setting sun is due to scattering of light.

Interference of light : When two light waves of exactly the same frequency and a constant phase difference travel in same direction and superimpose then the resultant intensity in the region of superposition is different from the sum of intensity of individual waves. This modification in the intensity of light in the region of superposition is called interference of light.

Diffraction of light : diffraction is the process by which a beam of light or other systems of wave is spread out as a result of passing through a narrow opening or across an edge.

Polarisation of light : Polarisation is the only phenomenon which proves that light is a transverse wave. Light is an electromagnetic wave in which electric and magnetic field vectors vibrate perpendicular to each other and also perpendicular to the direction of propagation. In ordinary light, the vibrations of electric field vector are in every plane perpendicular to the direction of propagation of wave. Polarisation is the phenomenon of restricting the vibrations of a light in a particular direction in a plane perpendicular to the direction of propagation of wave.

Human Eye

Least distance of distinct vision is **25 cm**.

Defects of human eye and the remedies :

Myopia or short sightedness : A person suffering from myopia can see the near objects clearly while far objects are not clear.
Causes :

- Elongation of eye ball along the axis.
- Shortening of focal length of eye lens.
- Over stretching of ciliary muscles beyond the elastic limit.

Remedy : Diverging lens is used.

Hyperopia or hypermetropia or longsightedness : A person suffering from hypermetropia can see the distant objects clearly but not the near objects.
Causes:

- Shortening of eye ball along the axis.
- Increase in the focal length of eye lens.
- Stiffening of ciliary muscles.

Remedy : A converging lens is used.

Presbyopia : This defect is generally found in elderly person. Due to stiffening of ciliary muscles, eye looses much of its accommodating power. As a result distant as well as nearby objects can not be seen.
Remedy:two separate lens or a bifocal lens is used.

Astigmatism : This defect arises due to difference in the radius of curvature of cornea in the different planes. As a result rays from an object in one plane are brought to focus by eye in another plane.
Remedy: cylindrical lens is used.

MAGNETISM

Magnetic Substance : On the basis of magnetic behavior, substances can be divided into three categories.

- **Diamagnetic substance:** Diamagnetic substances are such substances which when placed in a magnetic field, acquire feeble magnetism opposite to the direction of magnetic field.
  Examples : Bismuth, Zinc, Copper, Silver, Gold, Diamond, Water, Mercury, Water etc.

- **Paramagnetic Substance :** Paramagnetic substances are such substances which when

placed in a magnetic field acquire a feeble magnetism in the direction of the field.

Examples : Aluminum, Platinum, Manganese, Sodium, Oxygen etc.

- **Ferromagnetic substance :** Ferromagnetic substances are those substance, which when placed in a magnetic field, are strongly magnetized in the direction of field.
  Examples : Iron, Cobalt, Nickel etc.

Curie Temperature: As temperature increases, the magnetic property of ferromagnetic substance decreases and above a certain temperature the substance changes into paramagnetic substance.

Permanent magnets are made of **steel, cobalt steel, ticonal, alcomax and alnico**.

Electromagnets, cores of transformers, telephone diaphragms, armatures of dynamos and motors are made of **soft iron, mu-metal and stalloy.**

SOURCES OF ACID:

Citric acid — Lemons or oranges (Citrus fruits)
Lactic acid — sour milk
Butyric acid — Rancid butter
Tarteric acid — Grapes
Acetic acid — Vinegar
Maleic acid — Apples
Carbonic acid— Soda water aerated drinks
Stearic acid — Fats
Oxalic and — Tomato, wood sorrel.

- Conc. H_2SO_4 and HNO_3 is used to wash iron for its galvanization.
- Oxalic acid is used to remove rust spot.
- Boric acid is a constituent of eye wash.
- Formic acid is present in red ants.
- Uric acid is present in urine of mammals

Acidic strength

(i) HF <HCl<HBr< HI
(ii) CH_3COOH < H_2SO_4< HNO_3<HCl

AQUAREGIA: Mixture of nitric acid and hydrochloric acid,in a volume ratio of 1:3.

Uses of HCL :

- In gastric juices are responsible for the digestion.
- Used as bathroom cleaner.
- As a pickling agent before galvanization.
- In the tanning of leather.
- In the dying and textile industry.
- In the manufacture of gelatin from bones.

Uses of HNO_3:

- In the manufacture of fertilizers like ammonium nitrate.
- Nitric acid is used in the purification of gold & silver.
- In the manufacture of explosives like TNT, TNB , Picric acid etc.
- Nitro Glycerin (Dynamite)
- Found in rain water (first shower)
- It forms nitrates in the soil.
- In the manufacture of rayon.
- In the manufacture of dyes & drugs.

Uses of Sulphuric acid (H_2SO_4)

- In lead storage battery.
- In the manufacture of HCl.
- In the manufacture of Alum.
- In the manufacture of fertilizers, drugs, detergents & explosives.

Use of Boric acids :

- As an antiseptic.

CAREER POWER™
AN IIT/IIM ALUMNI COMPANY

Uses of Phosphoric acid :

- Its calcium salt makes our bones.
- It forms phosphatic fertilizers.

Uses of Ascorbic acid : Source of Vitamin C
Uses of Citric acid : Flavoring agent & food preservative.
Uses of Acetic acid : Flavoringagent & food preservative.
Uses of Tartaric acid : Souringagent for pickles**,** baking powder

PH value of some liquids:

Lemon juice	2.5
Apple juice	3.0
Vinegar	3.0
Urine	4.8
Saliva	6.5
Milk	6.5
Blood	7.4
Toothpaste	9.0

ACID PROPERTY:

Blue litmus paper turns red
Methyl orange -orange to pink
Phenolphthalein- colour less

BASE PROPERTY:

Red litmus paper turns blue
Methyl orange from orange to yellow

Phenolphthalein from colourless to pink

Uses of some important salts :

Sodium Chloride :flavoring agent in food. In saline water for a patient of dehydration (0.9% NaCl), In the manufacture of HCL etc.

Sodium iodate : Iodized salt to prevent Goitre disease.

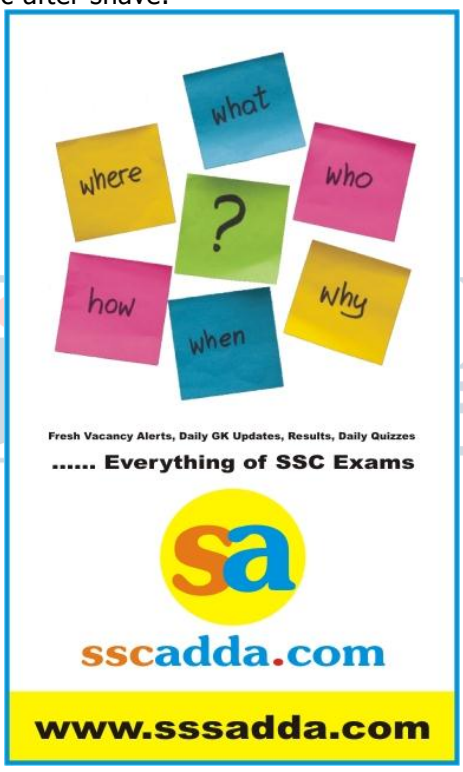
Sodium Carbonate : As washing soda, manufacturing of glass etc.

Sodium Benzoate : As a food preservative for pickles.

Potassium nitrate : As a fertilizer giving both K & N to the solid, gun powder ,match sticks etc.

Calcium phosphate: fertilizer

Alum : purification of water, dyeing industry , antiseptic after shave.



Vulcanization of rubber :

Vulcanization is a process of treating the natural rubber with sulphur or some compound of sulphur (SF6) under heat.

Vulcanized rubber is used for manufacturing rubber bands, gloves, car, tyres etc.

FIBERS: Fibres have quite strong intermolecular forces such as hydrogen bonding.

Nylon-66, dacron, orlon.

RAYON: Synthetic fibre obtained from cellulose

FUEL GAS

Water gas: mixture of carbon monoxide and hydrogen, high calorific value

Producer gas : mixture of CO and N_2

Coal gas :mixture of H_2, CH_4, CO and other gases like N_2, C_2 H_4, 0_2 etc

Oil gas :mixture of H_2, CH_4, C_2H_4, CO and other gases like CO_2

Gobargas:contains CH_4, CO and, H_2

Natural gas :mixture of gaseous hydrocarbons - methane 85% , ethane, propane butane etc.

LPG: Liquefied petroleum gas - butane and isobutane.

COALS:

Bituminous : Black, hard, smoky, flame, domestic fuel

Lignite : High moisture content burns easily, low calorific value.

Peat : Low grade coal produces less heat & more smoke & ash

Anthracite : Superior quality, hardest form, high calorific value

Compounds of metal and non-metal and their uses :

Ferrous oxide (FeO):In green glass, Ferrous salt.

Ferric oxide (Fe_30_4) : In electroplating of ornaments and formation of ferric slat

Ferrous sulphate ($FeSO_4.7H_20$) : In dye industry, and Mohr's salt

Ferric hydroxide [$(Fe(OH)_3)$] : In laboratory reagent and in making medicines.

Iodine (I_2): Antiseptic, In making tincture of iodine.

Bromine (Br_2): In dye industry, laboratory reagent

Chlorine (Cl_2) : Mustard gas, Bleaching powder.

Hydrochloric acid (HCl) : In the formation of aquaregiaand dyes

Sulphuric acid (H_2SO_4) : As a reagent ,In purification of petroleum,In lead storage battery.

Sulphur dioxide (SO_2) : As oxidants & reductants , bleaching agent

Hydrogen Sulphides (H_2S) : In qualitative analysis of basic radical (group separation)

Sulphur (S) : Antiseptics, vulcanization of rubber, gun powder, medicine.

Ammonia (NH_3) : As reagent in ice factory.

Nitrous oxide (N_20) : Laughing gas, Surgery.

Carbon dioxide (CO_2) : Soda water, Fire extinguisher.

Carbon monoxide (CO) : In phosgene gas

Graphite : As electrodes.

Diamond : Ornaments, Glass cutting, Rock drilling.

Alum [K_2SO_4 Al_2 $(SO_4)_3.24$ H_2O] : (i) Purification of water (ii) Leather industry.

Aluminum sulphate [$Al_2(SO_4)_3$. $18H_20$] : In paper industry/fire extinguisher.
Anhydrous aluminium chloride ($AlCl_3$) : Cracking of petroleum.
Mercuric Chloride ($HgCl_2$) : Calomel, Insecticides (Corrosive sublimate)
Mercuric oxide (HgO) : Ointment, poison.
Mercury (Hg) : Thermometer vermillion, amalgam.
Zinc Sulphide (ZnS) : White pigment.
Zinc Sulphate (White vitriol) ($ZnSO_4$. $7H_20$) : Lithopone, Eye ointment.
Zinc Chloride ($ZnCl_2$) : Textile industry.
Zinc oxide (ZnO) : Ointment.
Zinc (Zn) : In battery.
Calcium carbide (CaC_2) : Calcium cyanide & acetylene gas.
Bleaching powder [Ca(OCI)Cl] : Insecticides, Bleaching actions.
Plaster of paris : Statue, Surgery.
Calcium sulphate ($CaSO_4$ • $2H_20$) : Cement industry.
Calcium carbonate ($CaCO_3$) : Lime & toothpaste
Carbon dioxide (CO_2) : Soda water, Fire extinguisher.
Carbon monoxide (CO) : In phosgene gas ($COCl_2$).
Graphite : As electrodes.
Copper sulphate ($CuSO_4$-$5H_20$) : Insecticides, Electric cells.
Cupric oxide (CuO) : Blue & green glass, purification of petroleum
Cuprous Oxide (Cu_2O) : Red glass, pesticides.
Copper (Cu) : Electrical wire.
Sodium nitrate (NaNO3) : Fertilizer.
Sodium Sulphate (Glauber salt): Medicine, glass
Sodium bicarbonate (Baking soda) : Fire extinguish bakery, reagent.
Sodium Carbonate (Washing soda) : Glass industry,Paper industries, Removal of permanenthardness of water
Hydrogen peroxide : Oxidants & reductants, Insecticides.
Liquid hydrogen : Rocket fuel.

Facts About Some Metals

- Zinc phosphide is used for killing rats.
- Wood furnitureare coated with zinc chloride to prevent termites.
- Excess of copper in human beings causes disease called Wilson.
- Galvanised iron is coated with zinc.
- Rusting of iron is a chemical change which increases the weight of iron.
- Calcium hydride is called hydrolith.
- Calcium hydride is used to prepare fire proof and waterproof clothes.
- In flash-blub, magnesium wire is kept in atmosphere of nitrogen gas
- Titanium is called strategic metal because it is lighter than iron.
- Babbitt metal contains 89% Sn (Tin),Sb (Antimony) and 2% Cu (Copper).
- Chromium trioxide is known as chromic acid.
- Nichrome wire is used in electrical heater
- Potassium carbonate (K_2CO_3) is known as pearl ash.
- Generally transition metals and their compounds are coloured.
- Zeolite is used to remove hardness of water.
- In cytochrome iron (Fe) is present.
- Selenium metal is used in photo electric cell.
- Gallium metal is liquid at room temperature.
- Palladium metal is used in aeroplane.
- Radium is extracted from pitchblende.
- World famous Eiffel Tower has steel and cement base.
- Actinides are radio-active elements.
- Cadmium rod is used in nuclear reactor to slow down the speed of neutron.
- Sodium peroxide is used in submarine and also to purify closed air in hospital.
- Co(COBALT) is used in cancer treatment.
- Onion and garlic odour due to potassium.
- Oxides of metals are alkaline.
- Silver and copper are the best conductor of electricity.
- Gold and Silver are the most malleable metal.
- Mercury and iron produces more resistance in comparison to the other during the flow of electricity.
- Lithium is the lightest and the most reductant element.
- In fireworks, crimson red colour is due to presence of strontium (Sr). Green colour is due to the presence of Barium in fireworks.
- Barium sulphate is used in X-ray of abdomen as barium meal.
- Barium hydroxide is known as Baryta water.
- Osmium is the heaviest metal and the Platinum is the hardest.
- Zinc oxide is known as flower of zinc. It is also known as Chinese white and used as white paint.
- Silver chloride is used in photo chromatic glass.
- Silver iodide is used in artificial rain.
- Silver nitrate is used as marker during election. It is kept in coloured bottle to avoid decomposition.
- Silver spoon is not used in egg food because it forms black silver sulphide.

- To harden the gold, copper is mixed. Pure gold is 24 carat. Iron Pyrites (FeS2) is known as fool's gold.
- Mercury is kept in iron pot ,because it doesn't form amalgum with iron.
- In tube light there is the vapour of mercury and argon.
- Tetra-Ethyl lead is used as anti knocking compound.
- Lead-pipe is not used for drinking water because it forms poisonous lead hydroxide.
- Fuse wire is made up of lead and tin.
- Chlorofluoro carbon is known as Freon used as refrigerant
- Non-stick utensil is made up of Teflon.
- Chlorine is used to prepare PVC, insecticides herbicides etc. Bromine is used in ethylene bromide synthesis which is mixed with added petrol.
- In the preparation of AgBr which is used in photography.

INERT GASES:

- He, Ne, Ar, Kr, Xe, Rn
- Rn gas are absent in atmosphere.
- Argon is used in Arc. welding& electric bulb.
- Helium and nitrogen mixture used in balloon and , weather indicator etc.
- Neon is used in discharge tube glow light.

CATALYSTS AND IT'S USES:

- **Fe + Mo**- Synthesis of NH_3 by Haber's process.
- **Ni -** Synthesis of vanaspati Ghee (hydrogenation)
- **Pt-**Synthesis of H_2SO_4 by Contact process.
- **NO**-Manufacture of H_2SO_4 by the Lead chamber process.
- **Hot Al_20-**preparation of Ether from Alcohol.
- **$CuCl_2$** .Preparation of chlorine gas by Deacon process.

Some Important Explosive

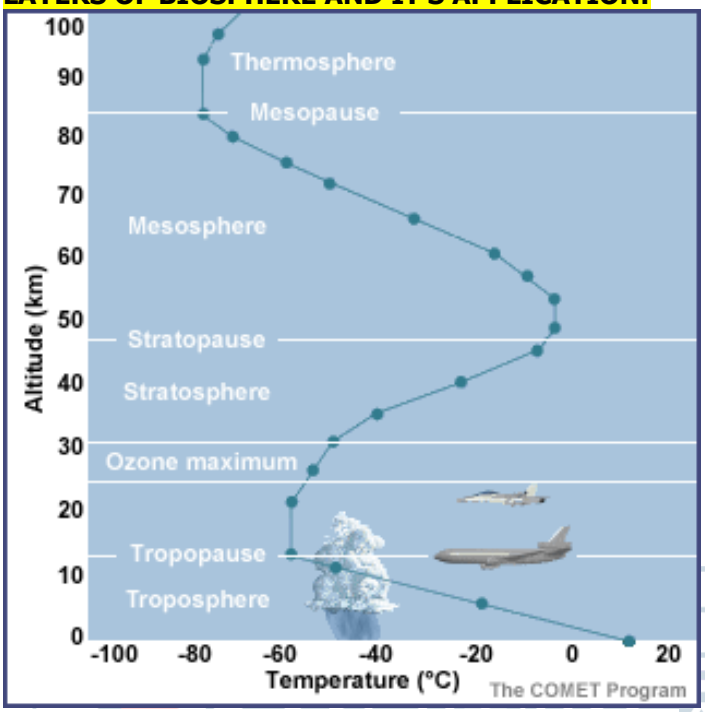
- **Dynamite** : It was discovered Alfred Nobel in 1863. It is prepared by absorption of raw dust with Nitro-glycerin. In modern dynamite Sodium Nitrate is used in place of Nitro-glycerin.
- **TNT**: Tri Nitro Toluene
- **TNB**: Tri Nitro Benzene
- **TNP**: Tri Nitro Phenol or picric acid.
- **R.D.X** is highly explosive known as plastisizer in which Aluminumpowder is mixed to increase the temperature and the speed of fire.

Some Important Facts

- Age of fossils and archeological excavation is determined by radioactive carbon (C-14).
- Chloroform in sunlight forms poisonous gas 'Phosgene' (COCl2).
- To decrease the basicity of soil gypsum is used.
- In the preparation of Talcom powder theophestal mineral is used.
- Potassium chloride is most suitable for the removal of permanent hardness of water.
- To avoid melting of ice gelatin is used.
- Saccharine is prepared from toluene.
- Cream is a type of milk in which amount of fat is increased while -amount of water decrease.
- From one kilogram of honeybee 3500 calorie energy is produces.
- Nitrous oxide is known as laughing gas.
- Bones contain about 58% calcium phosphate.
- Phosphine gas is used in voyage as Holmes signal.
- Chlorine gas bleaches the colour of flower.
- Red phosphorus is used in match industry.
- Urea contains 46% nitrogen.
- In the electroplating of vessel NH4Cl is used.
- Power alcohol is prepared from mixing pure alcohol in benzene which is used as rocket fuel.
- Artificial perfumes are prepared from Ethyl acetate.
- Urea was the first organic compound synthesised in Laboratory.
- Vinegar contains 10% acetic acid.
- Acetylene is used for light production and riping of fruits.
- Ferric chloride is used to stop bleeding.
- Barium is responsible for green colour in fireworks.
- Cesium is used in solar cells.
- Yellow phosphorus is kept in water.
- Sea weeds contains iodine.
- During cooking maximum vitamin is lost.
- For the preparation of silver mirror, glucose is used.
- When cream is separated from milk, it's density increases.
- For artificial respiration mixture of oxygen and helium gas cylinder is used.
- In cold places, to decrease the freezing point ethylene glycol is used.
- Hydrogen peroxide is used for oil paintings.

- Sodium is kept in kerosene oil.
- The heaviest element is Osmium (Os).
- The lightest element and least dense is lithium (Li).
- Fluorine is the most oxidising agent.
- Silver is the best conductor of electricity.
- Radon is the heaviest gas.

LAYERS OF BIOSPHERE AND IT'S APPLICATION:



Troposphere: This is the lowest atmospheric layer and is about seven miles (11 km) thick. Most clouds and weather are found in the troposphere. The troposphere is thinner at the poles (averaging about 8km thick) and thicker at the equator (averaging about 16km thick). The temperature decreases with altitude.

Stratosphere: The stratosphere is found from about 7 to 30 miles (11-48 kilometers) above the Earth's surface. In this region of the atmosphere is the ozone layer, which absorbs most of the harmful ultraviolet radiation from the Sun. The temperature increases slightly with altitude in the stratosphere. The highest temperature in this region is about 32 degrees Fahrenheit or 0 degrees Celsius.

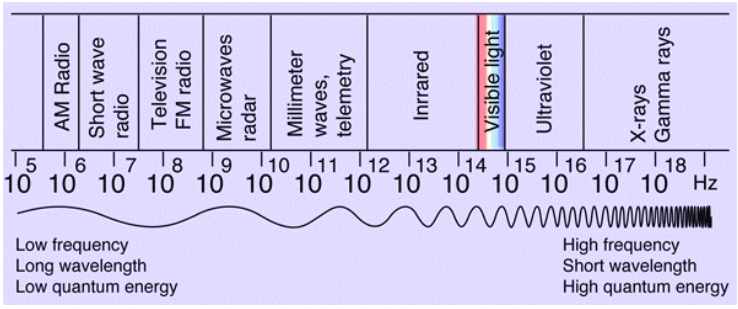
Mesosphere: The mesosphere is above the stratosphere. Here the atmosphere is very rarefied, that is, thin, and the temperature is decreasing with altitude, about –130 Fahrenheit (-90 Celsius) at the top.

Thermosphere: The thermosphere starts at about 55 kilometers. The temperature is quite hot; here temperature is not measured using a thermometer, but by looking at the motion and speed of the rarefied gases in this region, which are very energetic but would not affect a thermometer. Temperatures in this region may be as high as thousands of degrees.

Exosphere: The exosphere is the region beyond the thermosphere.

Ionosphere: The ionosphere overlaps the other atmospheric layers, from above the Earth. The air is ionized by the Sun's ultraviolet light. These ionized layers affect the transmittance and reflectance of radio waves.

RANGE OF WAVES SPECTRUM:



Radio: Your radio captures radio waves emitted by radio stations, bringing your favorite tunes. Radio waves are also emitted by stars and gases in space

Microwave: Microwave radiation will cook your popcorn in just a few minutes, but is also used byastronomers to learn about the structure of nearby galaxies.

Infrared: Night vision goggles pick up the infrared light emitted by our skin and objects with heat. In space, infrared light helps us map the dust between stars.

Visible: Our eyes detect visible light. Fireflies, light bulbs, and stars all emit visible light.

Ultraviolet: Ultraviolet radiation is emitted by the Sun and are the reason skin tans and burns. "Hot" objects in space emit UV radiation as well.

X-ray: A dentist uses X-rays to image your teeth, and airport security uses them to see through your bag. Hot gases in the Universe also emit X-rays.

Gamma ray: Doctors use gamma-ray imaging to see inside your body. The biggest gamma-ray generator of all is the Universe.

Plant Tissues

Cluster of cells is called a tissue is arranged and designed so as to give the highest possible efficiency of function.

Plants are stationary or fixed – they don't move, most of the tissues they have are supportive which provides them with structural strength. Most of these tissues are dead, since **dead cells can provide mechanical strength as easily as live ones and need less maintenance.**

Plant tissue is of two types:

1. **Meristematic Tissue** (They can divide)
   Depending on the region where they are present meristematic tissues are classified as apical, lateral and intercalary.
   Apical meristems are present at growing tips of stems and roots and increase the length of the stem and the root.
   The girth of the stem or root (Circumference increment) increases due to lateral meristem (cambium). **It helps in growth of stem eaten by animal.**
   Intercalary meristem is the meristem at the base of the leaves or internodes.
2. **Permanent tissue** (They lose the ability to divide)
   They are derived from meristematic tissue once they lose the ability to divide.

Permanent tissue is of two types:

a. Simple permanent tissue (Made up of 1 type of cells)

i. **Parenchyma** :
- Made up of living cells
- Loosely packed
- Provides support stores food and water
- Parenchyma consisting chlorophyll is called Chlorenchyma
- In aquatic plants large air cavities are present in Parenchyma to give buoyancy such Parenchyma is called Aerenchyma.
- Present in stem and roots.

ii. **Collenchyma**
- Provides flexibility
- Allows easy bending without breaking
- Provides mechanical support
- Living cells
- Present in leaf and stem

iii. **Sclerenchyma**
- Makes plant hard and stiff
- Husk of coconut
- Dead cells
- Walls thickened due to Lignin
- Present in stems around vascular bundles, in veins of leaves covering of seeds and nuts.

Epidermis is outermost layer of cell. Usually made of single layer of cells. The entire surface of a plant has this outer covering of epidermis. It secrete waxy water resistant layer on their outer surface and aids in protection against loss of water, mechanical injury and invasion by parasitic fungi.
- Small pores in epidermis of leaves (Stomata) are enclosed by two kidney shaped cells called Guard Cell.
- Stomata exchange gas with the atmosphere. Transpiration (loss of water in the form of water vapor) also takes place through stomata.
- Epidermal cell of roots increases absorptive surface area to absorb water.

Complex tissue (Made up of more than one type of cells)

Xylem and phloem are examples Complex tissues. They are conducting tissue.

Xylem
- Made up of four elements :Tracheids, vessels, xylem Parenchyma and xylem fibers.
- The cells have thick walls, and many of them are dead cells.
- Tracheids and vessels are tubular structures which allow them to transport **water and minerals vertically.**
- Parenchyma stores food and helps in the sideways conduction of water.
- Fibers are mainly supportive in function.

Phloem
- Made up of four elements : Sieve tubes, companion cells, phloem fibers and phloem parenchyma
- Sieve tubes are tubular cells with perforated walls.
- Phloem is unlike xylem in that materials can move in **both directions** in it.
- **It transports food from leaves to other parts of plants.**

Animal Tissue

1. Epithelial tissue
2. Connective tissue
3. Muscular tissue
4. Nervous tissue

1. Epithelial Tissue
- Covering or protective tissues
- Forms barrier to keep different body system separate
- Tightly packed and form a continuous sheet having cementing material between them

- Depending on shape and function epithelial tissue is classified as squamous, cuboidal, columnar, ciliated and glandular
- In cells lining blood vessels or lung alveoli where transportation of substances occurs through a selectively permeable surface, there is a simple flat kind of epithelium called simple squamous epithelium.
- Oesophagus and the lining of the moth are covered with sqauamous epithelium.
- Skin is also made of squamous epithelium.
- Where absorption and secretion occur, as in the inner lining of the intestine tall epithelial cells are present.
- Cuboidal epithelium forms the lining of kidney tubules and ducts of salivary glands.

2. **Connective Tissue**

- Loosely spaced and embedded in an intracellular matrix, matrix may be jelly like, fluid, dense or rigid.
- Different types of connective tissues in our body include areolar tissue, adipose tissue, bone, tendon, ligament, cartilage and blood.
- Blood is a connective tissue.
- Blood has a fluid matrix called plasma, in which RBC, WBC & Platelets are suspended.
- Plasma contains proteins, salts and hormones.
- Blood flows and transport gases, digested food, hormones and waste materials.
- Bone is also a connective tissue, provides framework that supports the body.
- Bone cells are embedded in a hard matrix that is composed of calcium and phosphorous compounds.
- Two bones connected to each other by another type of connective tissue called the ligament. This tissue is very elastic. Ligaments contains little matrix.
- Tendons connect bones to muscles and are fibrous tissue with great strength but limited flexibility.
- Cartilage is another connective tissue. The solid matrix is composed of proteins and sugars.
- Cartilage smoothens bone surfaces at joints and is also present in the nose, ear, trachea and larynx.
- Areolar connective tissue is found between the skin and muscles, around blood vessels and nerves and in the bone marrow.
- Fat storing adipose tissue is found below the skin and between internal organs.

3. Muscular Tissue

- Muscular tissue consists of elongated cells also called muscle fibers.
- Muscles contain special proteins called contractile proteins.
- Striated, unstriated and cardiac are three types of muscle tissues.

➢ **Voluntary muscles**

- Muscles which moves according to our will is called voluntary muscle, they are mostly attached to bones that is why called skeletal muscles.
- These muscles show alternate light and dark bands or striations when stained appropriately under microscope they are also called striated muscles.
- The cells of these tissue are long, cylindrical, unbranched and multinucleate(having many nuclei)

➢ **Involuntary muscles**

- Muscles which do not move according to our will.
- They are found in iris of the eye, in ureters and in the bronchi of the lungs, alimentary canal.
- They are uninucleate (Having a single nucleus)
- They are also called unstriated muscles.
- Muscles of the heart are involuntary called cardiac muscles.

4. Nervous Tissue

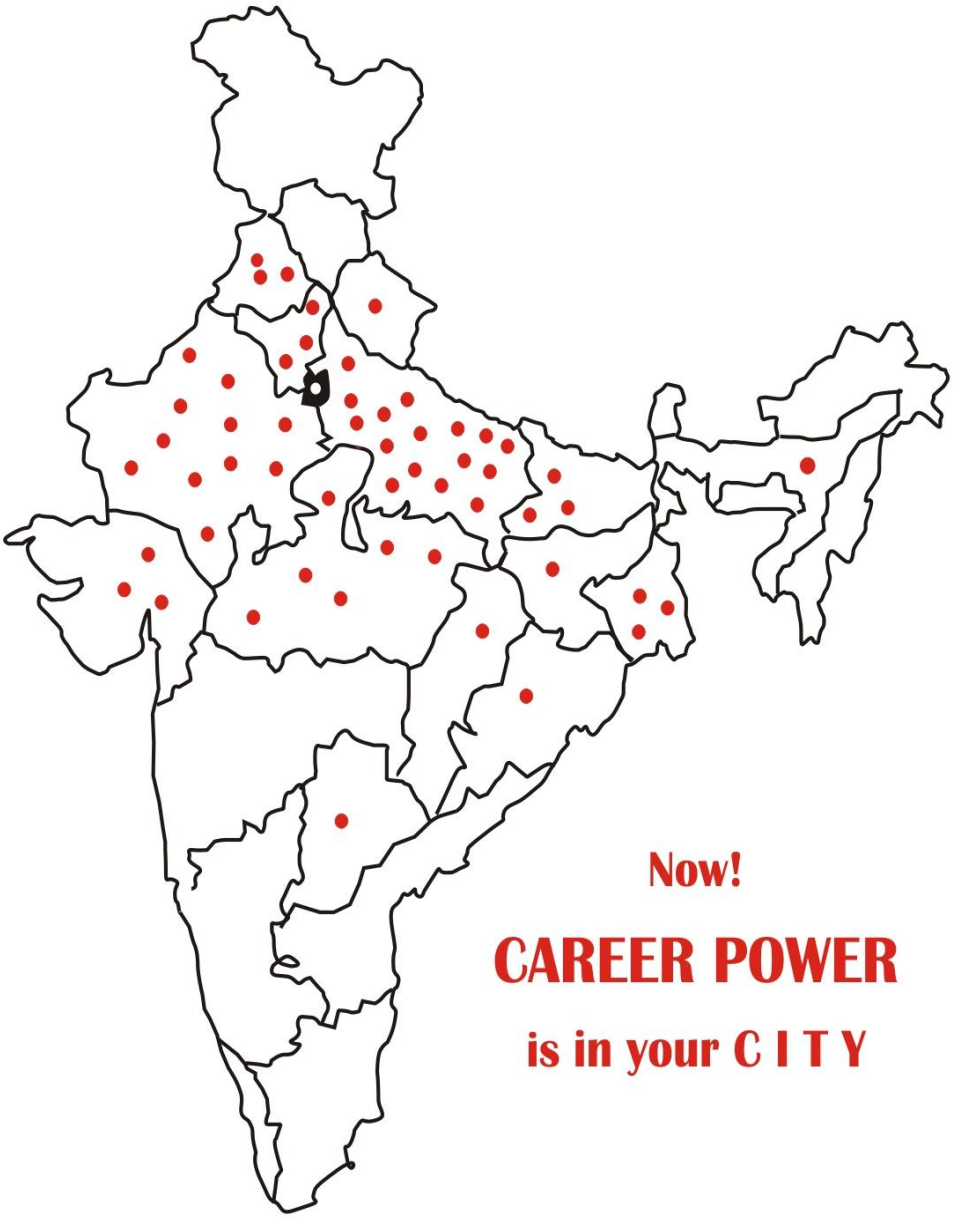
- All cells possess the ability to respond to stimuli.]
- Brain, spinal cord & nerves are all composed of the nervous tissue.
- The cell of nervous tissue is called nerve cell or Neuron.
- Usually each neuron has a single long part called axon.

SOME IMPORTANT FACTS ABOUT BIOLOGY

- Many short branched parts called **dendrites**.
- Father of Biology and Zoology – Aristotle
- Father of Botany – Theophrastus
- Father of Taxonomy – Carolus Linnaeus
- Father of Medicine – Hippocrates
- Euglena is an organism which exhibits the characteristic of both plants and animals .

- The Cell was firstly invented by an English Scientist Robert Hook in 1665.
- Cell Theory- The cell theory was jointly propounded by a botanist Schleden and a Zoologist Schwan in 1838-1839.
- Lysosome destroys itself in such a process so it is called suicide vesicle (bag) of the cell
- Mitochondria is called Power House of the cell.
- Ribosome is called the factory of protein.
- Chloroplast is called Kitchen of cell.
- The smallest cell is Mycoplasma Gallosepticum, while the largest cell is Ostrich's egg .
- Cell -wall is completely developed and which is composed of cellulose.
- The blue- green algae is a special type of bacteria which are called cyanobacteria.
- Lichen is a micro-organism which co-exist between cyanobacteria and fungi.
- Lichens are the indicators of the air pollution and for the maximum pollution there exist no lichens.
- The algae which appear on the ice are called Cryptophytes,while which appear on the rock are called Lithophytes.
- The Largest banyan tree of Indian Botanical Garden, Shivpur (Howarah)
- Pitcher plant leaves accommodate to trap the insects and modified themselves in the form of bags.
- The metal magnesium is found in the chlorophyll of plant leave and in the nucleus of the chlorophyll the atom of magnesium exists.

Our Presence in India



Now!

CAREER POWER

is in your C I T Y

Delhi
- Laxmi Nagar 08750505082
- Rohini 08750505047
- Uttam Nagar 08750505076
- Kingsway Camp 08750505084
- Munirka 08750505023
- Old Rajendra Nagar 08750505097

Uttar Pradesh
- Noida Sector-12 08750505074
- Bareilly 09012333385
- Varanasi-Durgakund 07275075593
- Noida Sector-18 08750505022
- Kanpur 07505050506
- Varanasi- Sigra 07275075594
- Ghaziabad 08750050801
- Meerut (Baccha Park) 07055546662
- Jhansi 09415828545
- Lucknow Mahanagar 07505050503
- Meerut (Old Delhi Chungi) 07055044779
- Moradabad 09837621116
- Lucknow Alambagh 07505950507
- Agra 07055891953
- Faizabad 08960360129
- Aligarh 07409093000
- Chandausi 08535013150

Coming Soon.. Mathura, Gorakhpur, Allahabad

Madhya Pradesh
- Gwalior 09644340011
- Guna 07542255877
- Rewa 09752216820
- Bhopal 09685985799
- Indore 08982737301
- Chhatarpur 09479652676

Rajasthan
- Jodhpur 08560807792
- Udaipur 09587387555
- Jaipur 07742836868
- Alwar 09024610363
- Bikaner 08094402345
- Pali 08560807794
- Hanumangarh 08385875151
- Sri Ganganagar 08385870101
- Ajmer 09772228899
- Sikar 08233200291
- Jhunjhunu 08875005981

Coming Soon.. Kota

Jharkhand
- Ranchi 09334652565

Coming Soon.. Dhanbad, Jamshedpur

West Bengal
- Kolkata 09339920009
- Rishra-Hooghly 09331918985
- Durgapur 09798973169

Punjab
- Bhatinda 09888377003
- Ludhiana 08872003570

Coming Soon.. Amritsar, Patiala

Odisha
- Brahmapur 09778433533

Coming Soon.. Cuttack, Puri, Bhubaneswar

Gujarat
- Ahmedabad 09726110183
- Gandhi Nagar 09104813773
- Anand 07567145525

Telangana
- Hydearabad 09319312467

Bihar
- Patna 07050816141
- Muzaffarpur 07061274036
- Ara 09931666733

Haryana
- Rohtak 08950455444
- Sonepat 09996017020
- Ambala 09355155557

Chhattisgarh
- Bhilai 09981083333

Coming Soon.. Raipur

Uttarakhand
- Roorkee 07060189489

Coming Soon.. Dehradun

Assam
- Guwahati 08752933801